FUSION PTR-TOF TASTES CHICKEN SOUP

Revealing the invisible: real-time nosespace PTR-TOF analysis

As the precepted flavor of food is strongly determined by the compounds entering the nose during mastication and swallowing, nosespace analysis is of particular importance for food and flavor scientists. Thus, PTR-MS coupled to a nosespace-sampler has become an indispensable tool for food industry and research over the decades.

Several years ago, we attempted a nosespace study during the consumption of different instant soups utilizing a (back then) state-of-the-art PTR-MS instrument with about 5000 m/Δm mass resolution. To our surprise, we could not find reasonable correlations between flavor-relevant compounds in the soup and detected concentrations in the nosespace.

In 2024 we repeated the study, but this time using the current benchmark for PTR-MS instruments, the FUSION PTR-TOF 10k with its mass resolution of about 15,000 m/Δm and sensitivities of up to 80,000 cps/ppbv.

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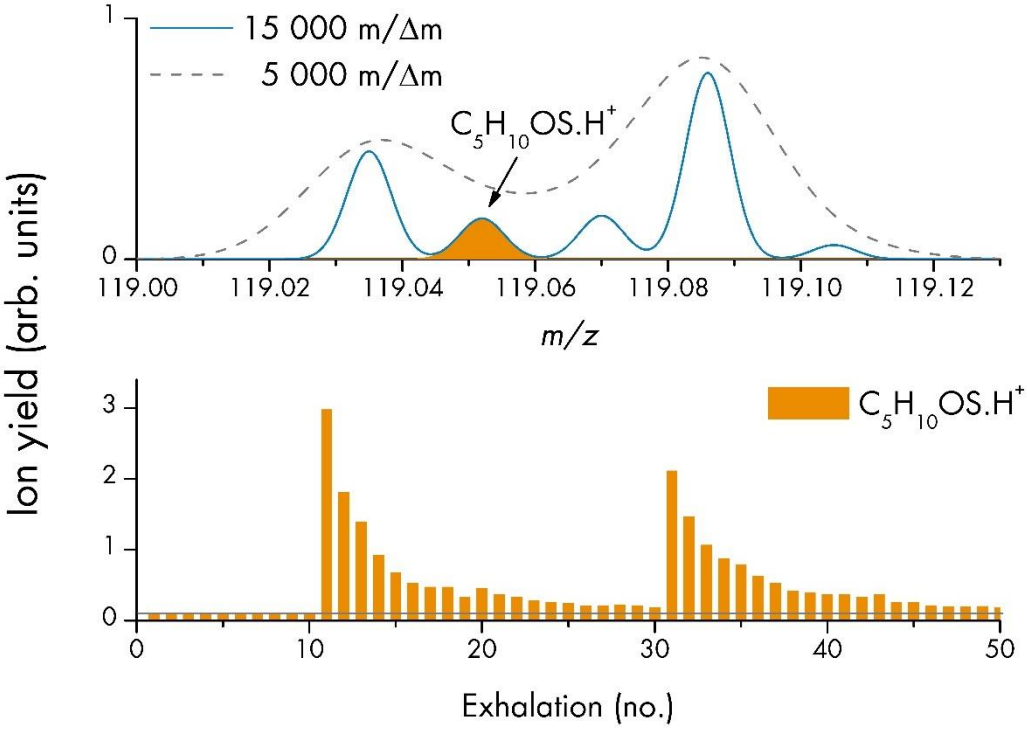
The results obtained can simply be described as a revelation. For example, protonated $C_5H_{10}OS$ ("onion aroma") is detected at nominal *m/z* 119. With the previous 5000 m/Δm (upper panel; dashed line) two peaks can be separated at this *m/z*, which could lead to the assumption that one of them would be the compound of interest. However, only the FUSION PTR-TOF 10k (solid line) reveals that $C_5H_{10}OS.H^+$ is completely masked by a series of isobars (from human metabolism, inhaled air, etc.). With 15,000 m/Δm a total of 5 isobaric compounds can be clearly distinguished and separately quantified.



In the lower panel the results for $C_5H_{10}OS$ evolvement in the participant's nosespace is shown. After 10 "blank" exhalations through the nose (sampled directly into the FUSION PTR-TOF 10k, without the need for any preparation) to establish a baseline, the participant takes a sip of chicken soup. $C_5H_{10}OS$ is detected and

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quantified in real-time, with the measured concentrations decreasing with each subsequent exhalation. Because of the extremely high sensitivity of the PTR-MS instrument, the compound can still be detected at a slightly elevated level after 20 exhalations, which is when a second sip was ingested.

In summary, the study confirms that the FUSION PTR-TOF is indeed the "Next Generation" of PTR-MS, opening up analytical worlds that were previously inaccessible.

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